

## **REMARKS**

This Amendment is fully responsive to the final Office Action dated August 13, 2009, issued in connection with the above-identified application. Claims 1-35 are pending in the present application. With this Amendment, claims 1, 13, 14, 26, 27, 29, 30 and 33 have been amended merely to correct typographical errors. No amendments have been made to address the prior art rejections to the claims. Accordingly, no new matter has been introduced. Favorable reconsideration is respectfully requested.

### **I. Examiner Interview**

The Applicants thank Examiner Colucci for granting the telephone interview (hereafter “interview”) conducted with the Applicants’ representative on November 2, 2009. During the interview, the distinguishable features between the present invention and the cited prior art were discussed in detail. In particular, it was noted that the cited prior art fails to disclose or suggest at least all the features of the lower-level N-gram language model of the present invention.

It was agreed that the cited prior art fails to disclose or suggest at least a lower-level N-gram language model that is an N-gram language model for calculating a link between the words included in the word that can be broken down into the plurality of words, as recited in the independent claims.

At the conclusion of interview, the Examiner indicated that if the Applicants can provide (in detail) the support in the Applicants’ disclosure for the above feature (i.e., in a formal response to the outstanding Office Action), then the finality of the rejection to the claims would likely be withdrawn. The Examiner also indicated that further search and consideration of the above feature would be necessary before making a final determination regarding the allowability of the claims.

### **II. Rejections under 35 U.S.C. 103**

In the Office Action, claims 1-5, 7, 9, 13-18, 22 and 26-35 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Rigazio et al. (U.S. Patent No. 6,182,039, hereafter “Rigazio”) in view of Deligne et al. (U.S. Patent No. 6,314,399, hereafter “Deligne”), and further in view of Millett et al. (U.S. Patent No. 6,584,458, hereafter “Millett”).

As noted during the interview, the Applicants maintain that the cited prior art fails to disclose or suggest at least all the features recited in independent claims 1, 13, 14, 26, 27, 29 and 30. For example, independent claim 1 recites *inter alia* the following features:

“[a] language model generation and accumulation apparatus that generates and accumulates language models for speech recognition, the apparatus comprising:

a higher-level N-gram language model generation and accumulation unit operable to generate and accumulate a higher-level N-gram language model that is obtained by modeling each of a plurality of texts as a sequence of words that includes a word string class indicating a linguistic property of a word string constituting (i) two or more words and (ii) at least one word included in the plurality of texts except for the words included in the word string class; and a lower-level N-gram language model generation and accumulation unit operable to generate and accumulate a lower-level N-gram language model that is obtained by modeling a sequence of two or more words within the word string class,...

the lower-level N-gram language model is an N-gram language model for calculating a link between the words included in the word that can be broken down into the plurality of words,....” (Emphasis added).

The features emphasized above in independent claim 1 are similarly recited in independent claims 13, 14, 26, 27, 29 and 30. Additionally, the features emphasized above in independent claim 1 (and similarly recited in independent claims 13, 14, 26, 27, 29 and 30) are fully supported by the Applicants’ disclosure (see e.g., pg. 22, line 15 to pg. 23, line 8; and Fig. 8). In particular, the claimed “lower-level N-gram language model” is equivalent to the “class dependent word N-gram” described in the Applicants’ disclosure.

In the Office Action, the Examiner relies on the combination of Rigazio, Deligne and Millett for disclosing or suggesting all the features recited in independent claims 1, 13, 14, 26, 27, 29 and 30. However, the Examiner relies primarily on Rigazio and Millett for disclosing or suggesting a “lower-level N-gram language model” that is similar to that of the present invention.

Rigazio discloses or suggests improving recognition performance by introducing constraints of the N-gram probability into sequences of phonetic units. For example, when

recognizing a word "Tony," the word is recognized while not only taking the acoustic similarity of "Tony" into consideration, but also the probability (N-gram) between the letters "t-o-n-y." In the Office Action, the Examiner asserts that a confusable set disclosed in Rigazio is the claimed lower-level N-gram because the N-gram model is applied to a unit smaller than a word. However, as noted during the interview, (in Rigazio) the unit of the lower-level N-gram is "a unit smaller than a word," which is an important difference between Rigazio and the present invention (as recited in independent claims 1, 13, 14, 26, 27, 29 and 30).

That is, in the present invention, a word is used as a unit even in the "lower-level N-gram." For example, the lower-level N-gram language model calculates a link between the words included in the word that can be broken down into the plurality of words. If the "lower-level N-gram" in Rigazio is used for recognizing a title such as "Red Cliff," for example, the sequence is modeled as "r-e-d-c-l-i-f-f." On the other hand, in the present invention, the sequence of the words is modeled, such as "red-cliff," and thus the constraints of the model are stronger than the model in Rigazio.

Millett discloses a computer system and a method for information indexing and retrieval. As described in Millett, a text index is created in two phases. In the first phase, a word list symbol table, an alphabetically ordered list, and a non-repeating word number stream are constructed from a source text. In the second phase, a word number access array, and in-memory full text index are constructed. The index data is then merged into a final index.

In the Office Action, the Examiner alleges that Millett discloses word streams that include word numbers that represent parent and child words. As described in Millett, the child word can be a linguistic root of another word (e.g., "peach" is a linguistic root of "peaches"), a sub word of another word (e.g., "CAD" is a sub word of CAD/CAM), or a phonetic representation of a word (e.g., "wal'rus" for "walrus"). The Examiner alleges that the above teachings of Millett, which differentiates child and parent words allows for an improved evaluation of the speech input by the system or method disclosed in Rigazio. However, as noted during the interview, Millett also fails to disclose or suggest the use of a lower-level N-gram language model that calculates a link between the words included in the word that can be broken

down into the plurality of words.

Moreover, Deligne fails to overcome the deficiencies noted above in Rigazio and Millett. Briefly, in Deligne, a partial word string is merely determined by a statistical standard, and is not a group of words having a specific meaning in a sentence, such as a title of a program. Conversely, the present invention (as recited in independent claims 1, 13, 14, 26, 27, 29 and 30) models a word string as a title so as to recognize the title even when, for example, the title "Red Cliff" appears only once in training data. On the other hand, the title would not even be grouped into a partial word string according to the method in Deligne.

As noted during the interview, Rigazio, Deligne and Millett fail to disclose or suggest at least all the features of the lower-level N-gram of the present invention (as recited in independent claims 1, 13, 14, 26, 27, 29 and 30). Accordingly, no combination of Rigazio, Deligne and Millett would result in, or otherwise render obvious, independent claims 1, 13, 14, 26, 27, 29 and 30. Moreover, no combination of Rigazio, Deligne and Millett would result in, or otherwise render obvious, claims 2-5, 7, 9, 15-18, 22 and 28 and 31-35 at least by virtue of their respective dependencies from independent claims 1, 13, 14, 27 and 30.

In the Office Action, claims 6, 8, 10-12, 19-21 and 23-25 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Rigazio in view of Deligne and Millett, and further in view of Hwang et al. (U.S. Publication No. 2002/0082831).

Claims 6, 8 and 10-12 depend from independent claim 1, and claims 19-21 and 23-25 depend from independent claim 14. As noted above, Rigazio, Deligne and Millett fail to disclose or suggest all the features recited in independent claims 1 and 14. Additionally, Hwang fails to overcome the deficiencies noted above in Rigazio, Deligne and Millett. Accordingly, no combination of Rigazio, Deligne, Millett and Hwang would result in, or otherwise render obvious, claims 6, 8 and 10-12 at least by virtue of their respective dependencies from independent claims 1 and 14.

### **III. Conclusion**

In light of the above, the Applicants respectfully submit that all the pending claims are patentable over the prior art of record. The Applicants respectfully request that the Examiner

withdraw the rejections presented in the outstanding Office Action, and pass this application to issue. The Examiner is invited to contact the undersigned attorney by telephone to resolve any remaining issues.

Respectfully submitted,

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